

Appl. No. : 10/824,798  
Filed : April 15, 2004

### **AMENDMENTS TO THE SPECIFICATION**

**Please amend the Specification as follows. Insertions are shown underlined while deletions are ~~struck through~~.**

Page 7, paragraph [0028]:

In an embodiment, atomic layer growth reaction is controlled as a function of physical contact of multiple gases with each other (temperature is not easy to be controlled responsively), and in that case, the purging of each gas may be effective and each section may be coupled to an exhaust system. Preferably, the first section where a more difficult gas to distribute flows has an volume which is larger than that of the second section where a less difficult gas to distribute flows.

Page 14, paragraph [0051]:

At reaction gas purging, an inert gas is introduced from the gas valves 20 and 22, and then the valve 9 is opened and remaining Gas A is exhausted from the exhaust valve 9. At this time, although the gas is exhausted from the exhaust duct 3 as well as via the exhaust valve 9, most of remaining gas is discharged via the exhaust valve 9 because an exhaust conductance level from the valve 9 is designed to be at a one-digit higher than the other (i.e., inside the shower plate). In an embodiment, the conductance of the valve 9 may be 3-100 times, preferably 10-50 times, that of the inside of the shower plate. When Gas B fed from the gas valve 24 is purged, an inert gas is similarly introduced from the valve 23; the exhaust valve 32 is opened to discharge remaining gas. At this time, although there may be gas exhausted from the gas discharge hole 6 via the exhaust duct 3, most of gas is discharged via the exhaust valve 32 because gas discharge conductance for the exhaust valve 32 is larger. In an embodiment, the conductance of the exhaust valve 32 may be 3-50 times, preferably 5-30 times, that of the inside of the shower plate.

Page 15, paragraph [0053]:

Fig. 4 is a schematic cross sectional view showing in detail an embodiment of the gas-feeding apparatus including a gas-distribution head 300. This figures does not show a substrate

**Appl. No.** : **10/824,798**  
**Filed** : **April 15, 2004**

heating support or susceptor and all gas valves. A first gas such as a low-vapor pressure material gas is introduced to a central gas pipe 110 through a gas line 121. The first gas is then introduced into a first compartment 82 of a gas guide (distribution plate) 108 through a gas-distribution plate 111. The first compartment 82 has a bottom plate having slits, and the first gas passes through the slits and flows into a second compartment 81 which is above an upper surface of an upper shower plate (a first plate) 141 having a plurality of bores (first bores) 112. The first compartment 82 and the second compartment 81 constitute a first section. When the first compartment 82 does not have a bottom plate, there is no clear boundary between the first compartment 82 and the second compartment 81. The first gas is then discharged to an interior 41 of a reaction chamber 1 through the bores 112 and bores (third bores) 114 which are connected by connectors 302 and which are formed in a lower shower plate (a second plate) 140 having a head surface 301. The bores 112 and 114 are aligned and connected. During the above process, the interior 41 is constantly exhausted using an exhaust duct 103 through an annular slit 40, wherein the gas is drawn radially toward the outer periphery of the interior 41.

Page 16, paragraph [0056]:

A second gas is introduced to a second section 107 from a gas feed port 105. The second section 107 is not communicated with the first section 81, 82. The plurality of bores 112 is connected to the bores 114 which are formed in the lower shower plate 140 without being communicated with the second section 107. The second gas is discharged to the interior 41 of the chamber 1 through bores (second bores) 106. The purging the second section 107 can be accomplished using an exhaust path 170 which has a larger path than that of the gas feed port 105, so that the conductance of the exhaust path 170 is greater than that of the slit 40. The purging of the second section 107 can be accomplished instantly using the exhaust path 170.

Page 17, paragraph [0063]:

Figs. 8-10 show another embodiment of the present invention. Fig. 8 shows a shower plate comprised of an upper shower plate 141' and a lower shower plate 140' (having a head surface 301'), between which a gas feed port 105' and an exhaust path 170' are formed. An upper surface of the upper shower plate 141' constitutes a first section, and a lower surface of the

Appl. No. : 10/824,798  
Filed : April 15, 2004

lower shower plate 140' constitutes an interior of a reaction chamber. A second section is formed between the upper shower plate 141' and the lower shower plate 140'. The first section and the interior of the chamber are communicated with each other through bores 112' which are formed in the upper shower plate and bores 114' which are formed in the lower shower plate 140'. The bores 112' and the bores 114' are communicated with each other and form continuous paths from the first section to the interior of the chamber. The bores 112' and 114' are distributed uniformly on the upper surface of the upper shower plate 141' and on the lower surface (the head surface) 301' of the lower shower plate 140', respectively. In contrast, the second section and the interior of the chamber are communicated with each other through bores 106' which are formed in the lower shower plate 140' exclusively at a central area of the lower shower plate 140'.

Page 18, paragraph [0065]:

Fig. 9 shows a schematic view of a gas feeding structure (a gas-distribution head 300') in addition to the shower plate. This schematic view omits details, and proportions and sizes are not accurate. Further, alignment, gaps, and clearances are not accurate. In this embodiment, the first gas such as WF6 is introduced through a valve 210 into a first section 81' through a central gas pipe 110 and along an inner surface of a gas guide 108'. WF6 is then discharged to the interior of the chamber which is under the lower surface (the head surface) 301' of the lower shower plate 140' through the bores 112' and 114'. When purging the first section 81', Ar is introduced through a valve 20' into the first section through the central gas pipe 110. The gas is purged from the first section through an annular gap 83' and a valve 109. TEB is introduced through a valve 21 into the first section 81' through the central gas pipe 110 and along the inner surface of a gas guide 108'. TEB is then discharged to the interior of the chamber which is under the lower surface of the lower shower plate 140' through the bores 112' and 114'. When purging the first section 81', Ar is introduced through a valve 20 into the first section through the central gas pipe 110. The gas is purged from the first section through an annular gap 83' and a valve 109. NH3 is introduced through a valve 24 into the second section 107' through a gas feed port 105'. NH3 is then discharged to the interior of the chamber which is under the lower surface of the lower shower plate 140' through the bores 106'. When purging the second section 107', Ar

**Appl. No.** : **10/824,798**  
**Filed** : **April 15, 2004**

is introduced through a valve 23 into the second section through the gas feed port 105'. The gas is purged from the second section through an exhaust port 170' and a valve 132.